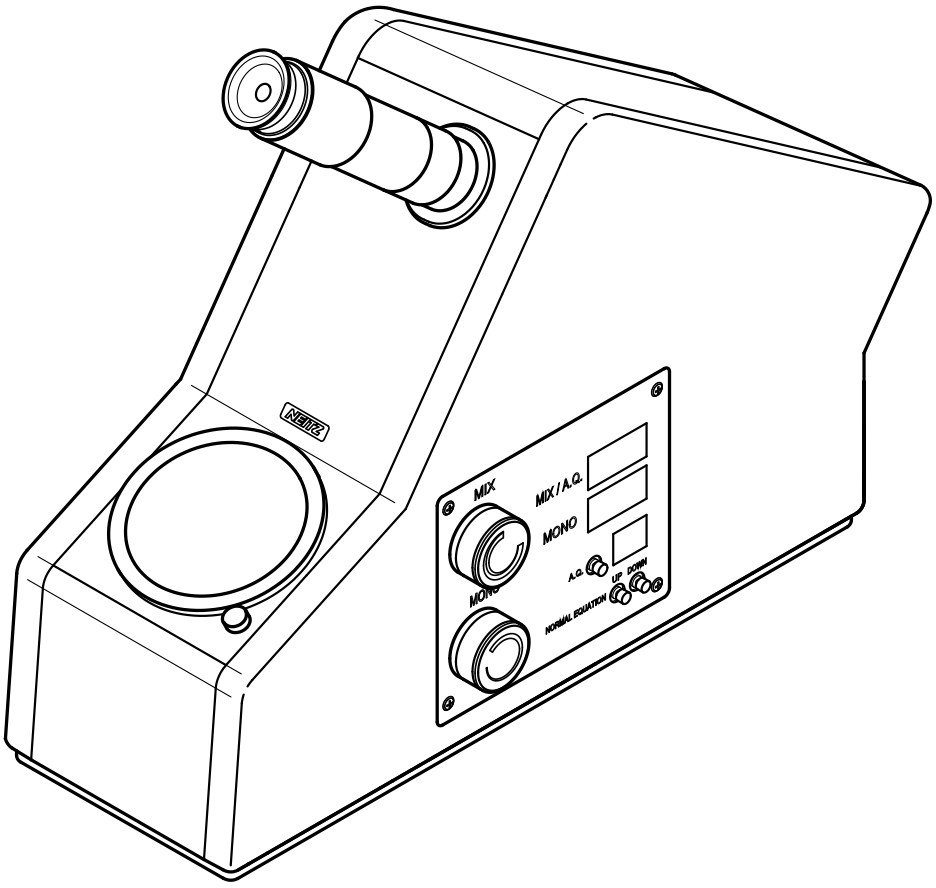
NEITZ ANOMALOSCOPE OT-11

Instruction Manual



June, 2012

Introduction

The NEITZ anomaloscope OT-II is a medical instrument for diagnosing color vision by combining mixtures of spectra that a patient is visually observing. The device incorporates high-quality LED light sources and optical devices for precision diagnosis. Please read this user's manual for proper use of the anomaloscope. Keep this user's manual with care for future reference.

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1. Precautions

Be sure to follow the precautions below for safe use of the device. Failure to do so may compromise the safety or performance of the device.

The symbols below show the types of instructions that you must follow:

 Prohibition	The symbol indicates a prohibition (a prohibited action).
 Instruction	This symbol indicates a compulsory action (an action that must be performed).
 Do not disassemble	This symbol indicates a prohibition regarding disassembly.
 Disconnect the power plug	This symbol indicates “disconnect the power plug from the outlet.”
 Do not handle with wet hands	The symbol indicates handling with wet hands is prohibited.

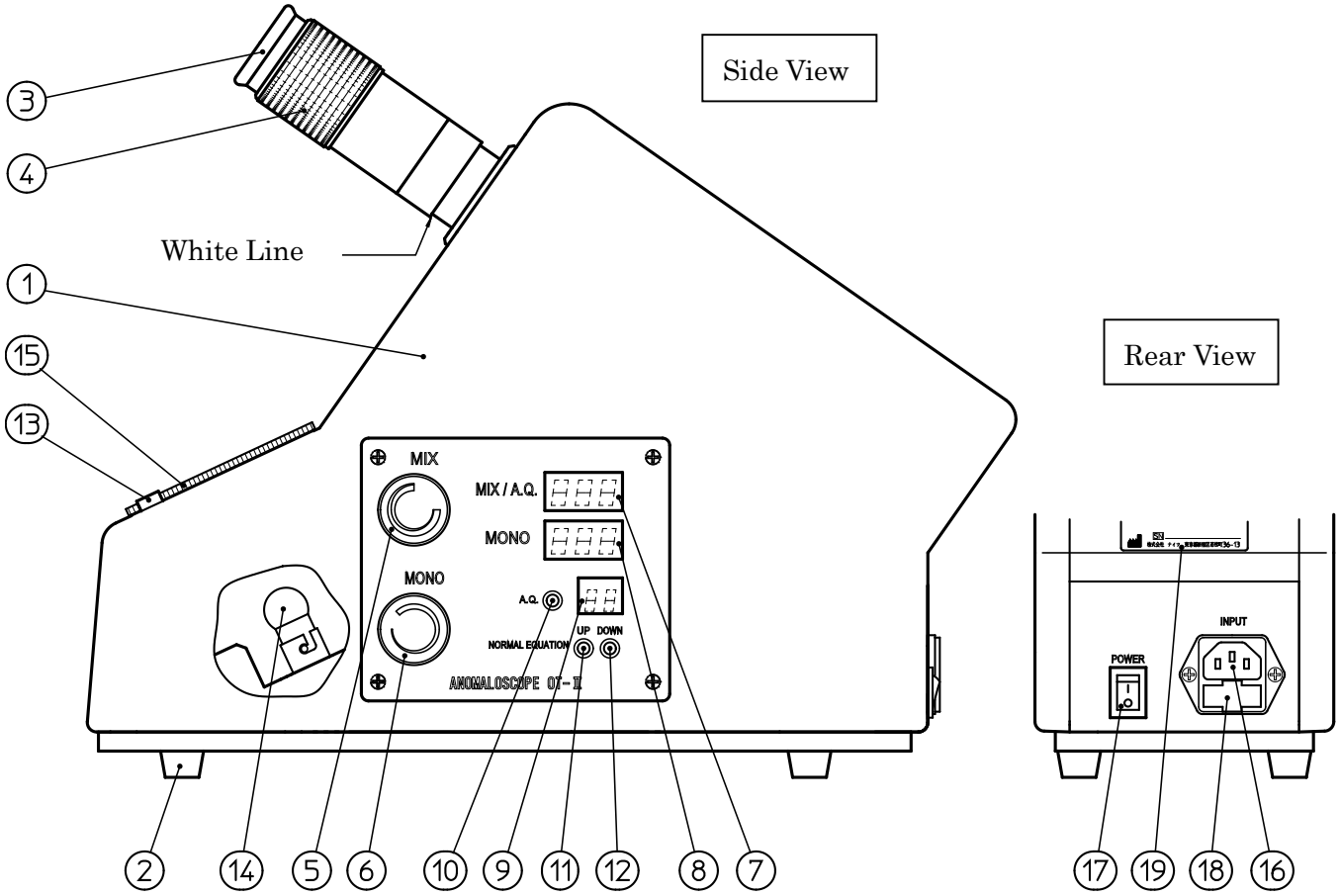
 **WARNING** Improper handling may cause death or serious injury.	
 Prohibition	Do not use the instrument in extremes of humidity or salt or in a place subject to water. Doing so may cause electrical shock.
 Prohibition	Do not use the instrument near flammable gases, such as propane gas and gasoline, or dust particles. Doing so may cause ignition or explosion.
 Prohibition	Do not place the instrument in an unstable or sloped place. Doing so may impair performance and cause failure or the device may tip over.
 Prohibition	Do not place weight through hands or place an object on the outer surface of the main unit. Doing so may disrupt the balance, resulting in injury or in the device tipping over.
 Prohibition	Use a genuine power cord and accessories only. Failure to do so may cause fire or failure.
 Prohibition	Do not use the power plug with dust or foreign matters on it. Doing so may cause fire.
 Prohibition	Do not use damaged cords. Doing so may cause electrical shock or fire.
 Prohibition	When routing the wiring, avoid multiple connection and obstacles. Failure to do so may result in the cords being caught/damaged or may result in a fall or injury.
 Prohibition	Do not insert an object into a gap on the main unit. Doing so may cause fire or failure.

 Prohibition	Do not apply strong impact to or throw an object at the instrument. Doing so may cause injury, failure or fire.
 Do not disassemble	Do not disassemble/modify the instrument. Doing so may cause electrical shock, fire or failure.
 Do not handle with wet hands	Do not touch the cords, outlet or instrument with wet hands. Doing so may cause electrical shock.
 Disconnect the power plug	If the instrument is not to be used for a long period of time or before performing maintenance on the instrument, unplug the power plug from the outlet. Failure to do so may cause electrical shock, fire or failure.
 Disconnect the power plug	If water or other liquids get inside the unit, immediately unplug the power plug from the outlet. Failure to do so may cause electrical shock, fire or failure.
 Instruction	When plugging the power plug into the outlet, exercise care not to contact the plug with metal objects, and plug fully into the outlet. Failure to do so may cause electrical shock or fire.
 Instruction	When unplugging the power plug from the outlet, avoid unplugging by pulling on cord; hold the plug to unplug the plug. Failure to do so may cause damage to the cord, electrical shock or fire.
 Instruction	When moving the instrument, take a stable position and hold the instrument at its bottom. Failure to do so may cause injury or failure.

⚠ **CAUTION** Improper handling may cause damage or physical loss.	
Prohibition	Do not use the instrument in a place subject to sudden temperature change, direct airflow from an air conditioner, or condensation. Doing so may cause electrical shock or failure.
Prohibition	Do not use the instrument in a place subject to direct sunlight or a harmful light. Doing so may cause failure or adversely affect the examination results.
Prohibition	Do not press on indicators applying a large force. Doing so may cause damage or failure.
Prohibition	When cleaning the instrument, avoid using thinner, abrasive cleaners or boiling water. Doing so may cause deformation or failure.
Instruction	Before using the instrument, check the conditions of each part and the normal color match to ensure that they are in normal condition. Failure to do so may adversely affect the examination results.
Instruction	To ensure highly reliable examination, it is recommended to have the instrument inspected/calibrated at least once in every two years. Failure to do so may adversely affect the examination results.
Instruction	When using the instrument after moving it from an environment outside the operating temperature range, wait until the instrument reaches equilibrium. Failure to do so may cause failure or adversely affect the examination results.
Instruction	When moving or transporting the instrument, use the dedicated packaging. Failure to do so may cause deformation or failure.
Instruction	Always monitor the instrument and patient; if an abnormal condition occurs, immediately stop using the instrument and take appropriate corrective action.

2. Product Components and Description of Functions

Main unit



(1) Cover

(2) Rubber foot
Total of four rubber feet are provided under the bottom. Install the instrument stably to prevent it from wobbling.

(3) Eyepiece
The patient looks into the anomaloscope via the eyepiece with one of his/her eyes.

(4) Diopter ring
Turn the entire ring to focus on the target view. The white line indicates the average focus position.

(5) Color mixture control knob
Turning the knob changes the color in the upper half of the target field. The color ratio on the color scale corresponds to the color ratio of two wavelengths.

(6) Yellow luminance control knob
Turning the knob changes the brightness in the lower half of the field. A larger width on

the scale corresponds to a higher luminance.

(7) Color mixture indicator/A.Q. indicator
The color mixture indicator/A.Q. indicator indicates the color mixture ratio in the upper half of the target field in values. The indicator indicates A.Q. when the A.Q. indicator switch is pressed.

(8) Yellow luminance indicator
The yellow luminance indicator indicates the luminance in the lower half of the target field in values.

(9) Normal color mixture indicator
Pressing the A.Q. indicator switch indicates the preset color mixture value for a color-normal observer.

(10) A.Q. indicator switch
Pressing and holding down the A.Q. indicator switch shows an A.Q on the color mixture indicator/A.Q. indicator while the switch is being held down. At this time, the normal color mixture indicator shows a normal color mixture value.

(11) Normal color mixture increment switch
Pressing the switch while the A.Q. indicator switch is being pressed and held down increments the normal color mixture value.

(12) Normal color mixture decrement switch
Pressing the switch while the A.Q. indicator switch is being pressed and held down decrements the normal color mixture value.

(13) Light adaptation switch
Pressing and holding down the switch lights up the light bulb for light adaptation while the switch is being held down.

(14) Light bulb
A light bulb for light adaptation.

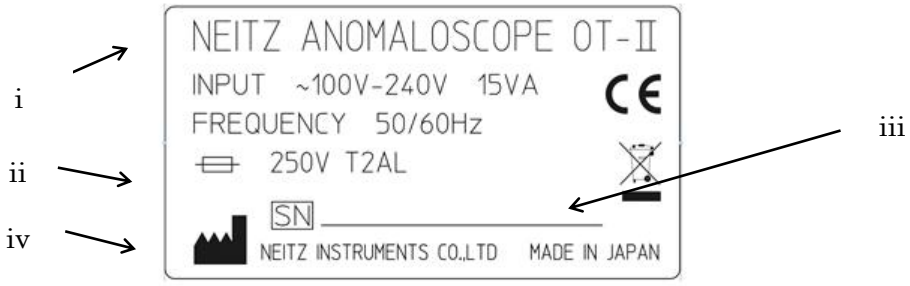
(15) Light adaptation field
The field is uniformly illuminated by the light bulb.

(16) Inlet
An inlet that accommodates the power cord plug to receive AC power.

(17) Power switch
Pressing down the " | " side of the switch turns on the power, and pressing down the "○" side of the switch turns off the power.

(18) Fuse holder

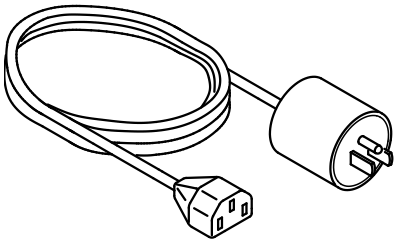
(19) Nameplate
The nameplate provides information on the instrument.



i: Brand name of the instrument
ii: Fuse rating
iii: Serial number
iv: Symbol given to the manufacturer

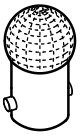
Accessories

(1) Power cord



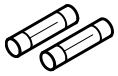
(2) Spare light bulb

Model: L-50

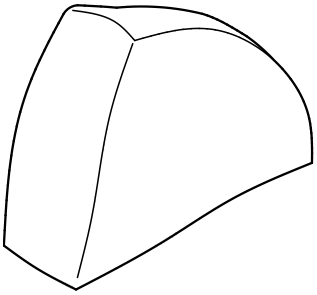


(3) Spare fuse (2)

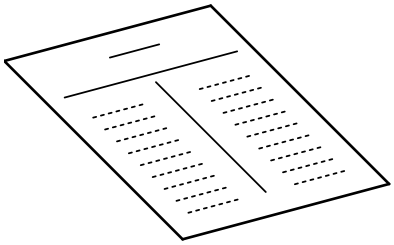
Rating: 250 V, T2AL



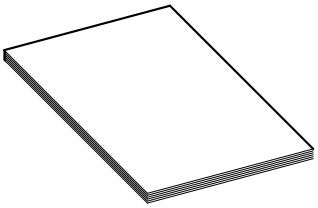
(4) Dust cover



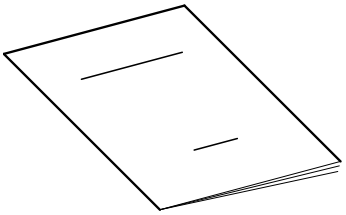
(5) Package insert



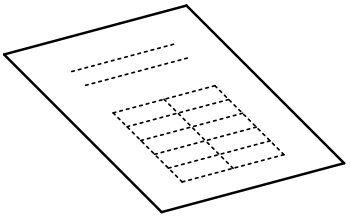
(6) Test paper



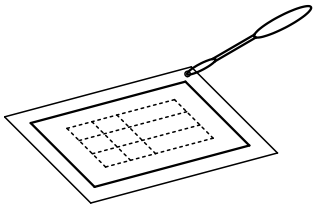
(7) Instructions for color vision test using the Neitz Anomaloscope OT
A booklet describing the detailed features of the Neitz Anomaloscope OT and test instructions using the instrument. It also describes case-by-case test result characteristics.



(8) Color vision terminology
The Japanese Ophthalmological Society (JOS) made changes to the color vision terminology in 2005.
The terms used in the documents on the instrument published before the changes should be replaced with new ones and read as such.



(9) Inspection and maintenance record book
The anomaloscope is a precision optical instrument. The precision may fluctuate depending on changes in temperature/humidity or impacts during transportation.
In addition, the performance of optical devices may change after a long period of use. Perform periodic inspection and adjustment to maintain the performance of the instrument.



(10) User's manual (this document)

3. Instructions for Use

3-1. Installation

(1) Install the main unit on a level and stable table.
When transporting the instrument, hold it by its bottom with both hands; do not hold it by the viewing tube.

> Do not install the instrument near a colored curtain or wall.
> Avoid a place where the sunlight or reflection is within the viewer's field of view.

(2) Plug the power cord into the inlet, and plug the 3P plug into an earthed outlet.

3-2. Examination

(1) Turn on the power.

(2) When looking into the anomaloscope via the eyepiece, the observer sees a horizontally split circular target. Allow the patient to turn the diopter ring until he/she obtains the clearest view of the target contour.

> When examining both eyes of the patient, adjust the focus for the eye to be examined every time before an examination.
> The patient needs to bring the eye to be examined close enough to the eyepiece to avoid the entrance of external light.
> Avoid using the eyeglasses wherever possible.
> It is recommended to cover the other eye with an occluder.

(3) Adjust the table and chair heights so that the patient is able to see the target at the center of the eyepiece in an upright position.

> Looking at the target from a horizontally or vertically shifted position may cause red or green rims appear in the left and right areas of the target in the former case and in the top and bottom areas in the latter case. Allow the patient to check how the target appears, and advise him/her to look into the eyepiece in the center position.

(4) Adjust the color mixture control knob and yellow luminance control knob to determine the point where the patient perceives that the colors and brightness in the upper and lower halves are identical (the state of which is referred to as “color matching,” and each value of the state are referred to as “color match(es).”) The color vision is evaluated based on the color matches at the point.

> The control knobs should be operated by the examiner; do not allow the patient to operate them. Looking at the target for an extended period of time may cause chromatic adaptation. To neutralize the adaptation, light up the light adaptation field as needed and advise the patient to look at the field.

Usually, the normal color match occurs at 40 units of red and 15 units of yellow, although it varies depending on the observer.

3-3. Using the A.Q.

After a long period of use, the normal color match may drift due to the changes in the LED/optical device performance or dust on the instrument. As a result, the test results for the same person using the same instrument may be different from those obtained before. Care must be taken in comparing the results under such conditions or comparing color matches obtained by different instruments.

The concept of anomalous quotient (referred to as A.Q.) is derived from the principle that the difference in the physical property of a light source is perceived equally by color-normal observers and color-defective observers (proposed by Trendelenburg in 1929).
Using the A.Q. in place of a color mixture value may facilitate comparison under the unstable conditions described above.
To obtain A.Q.:

$$A.Q. = \frac{(73-a') / a'}{(73-a) / a}$$

a: Color mixture value for the normal color matching

a': Color mixture value for the patient's color matching

According to the equation, when the A.Q. of a patient is 1.00, the color mixture for his/her color matching is equal to the normal color mixture.

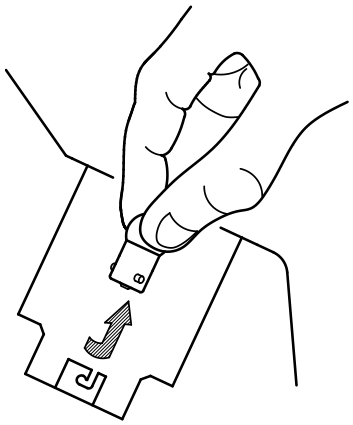
If the A.Q is greater than 1.00, the observer added more green than a color-normal observer to the mixture to obtain his/her color match. If the A.Q is smaller than 1.00, the observer added more red than a color-normal observer to the mixture to obtain his/her color match.
The instrument incorporates a function that automatically calculates the data.
Pressing the A.Q. indicator switch shows the normal color mixture on the normal color mixture indicator and A.Q. on the A.Q. indicator.
To modify the normal color mixture value, press the normal color mixture increment/decrement switch while pressing and holding down the A.Q. indicator switch.

After modifying the normal color mixture setting, it takes about 5 seconds for the system to store the data.
Note that turning off the power within 5 seconds after the value is modified and restarting the instrument will not update the normal color mixture setting.
The default setting of the normal color mixture is 40.

4. Maintenance

4-1. Replacing the light bulb for light adaptation

(1) Turn off the power switch and disconnect the power cord from the outlet.
(2) Turn the frame of the light adaptation field (knurled portion) counterclockwise and remove the frame.
(3) Slightly press and turn the bulb counterclockwise to remove the bulb.
(4) Install a new light bulb in the reverse order of removal.
(5) Replace the frame of the light adaptation field.

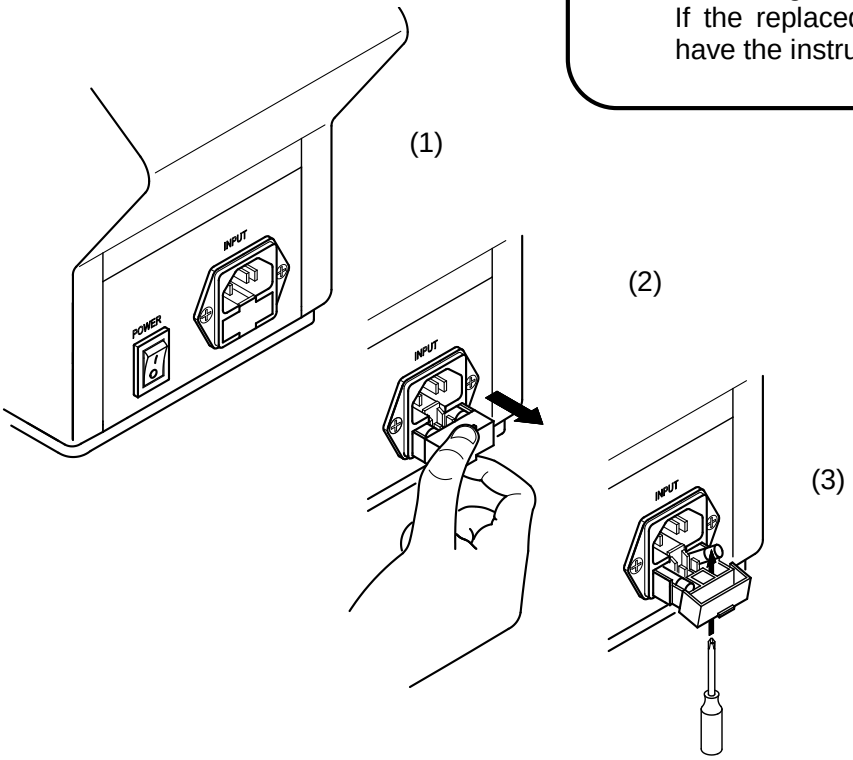


When replacing the light bulb right after using the instrument, pay due attention to avoid burn injury.
Be sure to use our genuine spare light bulb.

4-2. Replacing the fuse

(1) Turn off the power switch and disconnect the power cord from the outlet.
(2) Hold the fuse holder by the top and bottom tabs with fingers and pull out the holder.
(3) Open the pulled portion downward to expose the fuse; remove the fuse.
If the fuse is difficult to remove, use a screwdriver or the like and insert it into the hole in the holder bottom and push the fuse out of the holder.
(4) After replacing the fuse, install the fuse holder in the reverse order of removal.

Be sure to use a fuse with the specified rate.
Never use a metal wire or the like in place of the fuse; doing so is dangerous.
If the replaced fuse blew again, have the instrument inspected.



4.3 Cleaning

(1) Cleaning the cover (exterior)
Wipe with a soft dry cloth or with a cloth slightly moistened with water or much diluted detergent.
Clean the indicator surfaces with care, and avoid wiping or pushing them applying a strong force.

Before cleaning the instrument, turn off the switch and disconnect the power cord from the outlet.

(2) Terminals, switches and knobs
Wipe with a soft dry cloth, or use swabs to remove dust and foreign matters.

(3) Eyepiece (glass)
Clean the eyepiece using a commercially available lens cleaner or the like.
Always keep it clean and avoid touching it with fingers.

(4) When the instrument is not used, install the dust cover and store it in a manner to prevent dust from contaminating it.

4-4. Inspection/calibration

(1) Checks before inspection
Before starting inspection, check each part, including connection cords, for abnormal condition. Check that the color match setting is valid by testing the instrument on a color-normal observer.

(2) Inspection/calibration
Keep track of the instrument using the inspection and maintenance record book, and perform periodic inspection and calibration to maintain the performance of the instrument. Contact the office using the contact information and have the instrument inspected/calibrated at least once in every two years.

4-5. Disposal

(1) Disposing of the instrument
To dispose of the instrument, return the instrument to the manufacturer or the dealer to disassemble and separate it for disposal.

5. Troubleshooting

If a problem occurs, troubleshoot the problem according to the instructions below.
If the problem persists after troubleshooting has been completed, contact the office using the contact information.

Problem	Possible cause	Troubleshooting
The color mixture or yellow luminance indicator does not indicate anything after the power is turned on.	The power cord is not plugged into the outlet or connected to the inlet.	Plug in or connect the cord securely.
	The fuse is blown.	Refer to “4-2. Replacing the fuse” and replace the fuse.
	The fuse holder is not correctly installed in the main unit (protruded).	Turn off the power, unplug the power cord, and insert the fuse holder as far as it will go.
The normal color match is different from the usual value. The value seems to be drifted.	Deviation in A.Q. judgment may mean that the A.Q. setting has been modified.	Check the normal color match value, and re-enter an appropriate value.
	The eyepiece is dirty or there is foreign matter on it.	Clean the eyepiece.
	The eyepiece is not properly focused for the observer.	Focus the eyepiece properly.
	The instrument is installed in a place subject to outside light or reflection.	Move the instrument to an unaffected area.

6. Major Specifications

1. Name
   Product name: Neitz Anomaloscope OT-II
   Generic name: Anomaloscope
   Marketing approval number: 13B2X00131109501

2. Main unit dimensions and weight
   Dimensions; approx. 323 (H) x 371 (W) x 125 (D) (mm)
   Weight: Approx. 4.4 kg

3. Power rating
   - 100 V – 240 V, 50/60 Hz, 15 VA

4. Indicator range

The color mixture field (upper half of the target): The relative mix of green and red changes in the range from 0.0 to 73.0 in steps of 0.5. The total value is constant (73).

Mixture scale: 0.0  73.0

Pure green Pure red

The test field (lower half of the target): The luminance changes in the range from 0.0 to 87.0 in steps of 0.5.

Brightness scale: 0.0  87.0

Dark Brightest yellow

A.Q. Indicator: The A.Q. is calculated based on the normal color mixture and patient's color mixture.
Valid settings for the normal color mixture: 37, 38, 39, 40, 41, 42, 43, 44

5. Interference filters

Red wavelength:	670 (+3, -1) nm interference filter
Yellow wavelength:	588 (+3, -1) nm interference filter
Green wavelength:	545 (+3, -1) nm interference filter

6. Viewing angle and diopter

Viewing angle of the circular target: 2°10′ (average focus)
Diopter compensation: +7D - -8D
(the white line marked on the diopter ring corresponds to 0D.)

7. Operational environment

Rated operating temperature:	15°C to 30°C
Rated transportation/storage temperature:	-20°C to 60°C
Rated operating humidity:	35% - 75%
Rated operating pressure:	700 hPa – 1060 hPa

8. Safety

Compliant to JIS T0601-1:	1999
Type of protection against electric shock:	Class I
Degree of protection against electrical shock:	Type B
EMC IEC60601-1-2:	2007
Degree of ingress protection against water, solid particles:	IPX0
Operation mode:	continuous operation

7. Contact Information

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http://www.neitz.co.jp